

Remarks/Arguments:

Independent claim 1 has been substantially amended to further define the invention and to expedite prosecution of this application. Specifically, claim 1 is amended to further define the invention as including a second signal line (see, i.e., line 13' in FIG. 1) which is electrically coupled to the claimed first signal line (13, FIG. 1) by a conductive thru-hole (25, FIG. 1) which, significantly, extends through the substantially solid conductive ground plane (21, FIG. 1) to make this connection. (To accommodate this connection, the solid ground plane includes an opening therein (see FIG. 1) such that the thru-hole extends there-through without physically contacting the ground plane.) The claimed substrate now also includes a second dielectric layer on which the second signal line is positioned, and the solid ground plane is understandably between both dielectric layers (FIG. 1 shows plane 21 between layers 19 and 23). The previously claimed conductive ground lines provide the defined shielding, as does the solid ground plane having the opening therein to accommodate the thru-hole (see, e.g., page 8, lines 1-6 and page 13, line 27 through page 14, line 3) which provides the coupling between both signal lines. Applicants thus teach the unique concept of providing signal connections through a substantially solid planar structure (ground plane) which provides grounding for the substrate including these elements and also which provides shielding for the signal lines, all in a multilayered structure able to operate at high and low frequencies with the lines arranged in a high density format (see, e.g., page 14, lines 3-12. It is respectfully submitted that this particular feature is deemed unobvious because it requires sacrificing (by forming an opening) part of the very structure (the otherwise solid ground plane) which is needed to provide the essential shielding. Applicants respectfully argue that one of ordinary skill in the art would not think to deprive himself/herself of part of such a shield structure when such shielding is an essential aspect of the final structure, especially in a final structure able to perform as taught herein (at high and low frequencies and all in a high density format).

Dependent claims 2-6 are amended consistent with the amending of claim 1 from which these claims depend. Dependent claims 7 and 8, having the limitations thereof incorporated within the preceding claims, are cancelled and original claims 9-12 remain as originally presented (no amending is necessary).

Claim 13, previously independent, is amended to be in dependent form for ease of review (it depends from the claim 1 “chain”) and to further define the claim 1 invention as including a third conductive signal line positioned on the second opposing side of the first dielectric layer adjacent the first conductive signal line such that the first and second conductive ground lines and the substantially solid conductive ground plane combine together to provide shielding for the third conductive signal line during the passage of electrical current through this third conductive signal line. Support is seen in FIG. 3 (added signal line 13' adjacent signal line 13').

Dependent claims 14 and 15, previously dependent from claim 13, are dependent from claim 13 and claim 1, respectively, and retained in this order, again, for ease of review. Claim 14 adds the limitations that the claim 13 structure further includes a ground line between the two claimed signal lines and which also provides shielding. This embodiment is shown clearly in FIG. 4, where ground line 157 provides such protection. Dependent claim 15 adds the limitations that dielectric layers and solid ground planes may be added to the claim 1 structure, with the ground planes adding yet further shielding for the signal line. Support is clearly shown in FIGS. 3 and 4, where the outer ground planes 21" and 21"" offer this protection.

Dependent claims 16 and 17 are cancelled for expediency purposes due to the cancellation of formerly independent claim 13 from which these depended.

Claims 18-21 are cancelled in view of the previous restriction requirement and the withdrawal thereof from consideration by the Examiner.

New independent claim 22 is added to include the limitations of previous independent claim 13 and the added limitations now found in claim 1. Dependent claims 23-25 include limitations of claims previously dependent from claim 13, but now depend from new independent claim 22.

Support being provided for all of the above amending, the amending does not include the addition of new matter and entry is respectfully urged.

The claims now presented are deemed allowable over the documents of record herein, including particularly the patent to Shimada (6,353,189) and the published patent application to Ishizuki (2004/0009666), taken singularly or in combination. The rejections based on *35 USC 102* and *35 USC 103* as cited in the Office Action are thus overcome and withdrawal thereof urged. Neither Shimada nor Ishizuki teach or suggest a coupling of one signal line to a second signal line using a conductive thru-hole which extends through (but is not electrically connected to) a solid ground plane which serves to provide shielding for the one signal line, all in combination with two adjacent (to the one signal line) ground lines which also shield the one signal line being shielded and which, significantly, are coupled to the solid ground plane. Shimada appears primarily interested in formation of conductive “pillars” (i.e., 7A, 7S) which need be strategically oriented (see FIG. 6) to provide line shielding. Ishizuki describes the well known use of a conductive “via” (i.e., 34 in FIG. 4) to couple two signal planes but does not appear to suggest doing so through a solid ground plane in combination with adjacent ground lines that work together to shield one of the signal lines, especially where the ground lines are also connected to the ground plane. Extending either of these documents to using a conductive thru-hole which passes through one of the elements (a solid, conductive ground plane) in an electrically isolated manner while affording connection between different signal lines is well beyond the capabilities of one of ordinary skill in the instant art having said documents before him/her. The same is true for the additional unique teachings provided in the dependent claims.

The several additional documents cited by the Examiner in the Office Action have also been reviewed. None of these documents, taken singularly or in combination, teach or suggest the now claimed invention.

The rejections are overcome and withdrawal again urged. Allowance of the remaining claims is earnestly and respectfully requested.

All of the claims presented herein containing allowable subject matter, allowance is requested. Applicants respectfully request that a timely Notice of Allowance be issued in this case. Should the Examiner believe that minor changes are needed which, if made, will result in allowance of the Application and that such changes can be readily discussed in a phone conversation, the Examiner is cordially requested to phone the undersigned, collect, at the number provide below, for this purpose.

Applicants again must raise the issue of the improper drawings which were identified as part of the application as filed, which issue Applicants raised earlier in this application upon noticing the error. Applicants most respectfully request that they be informed that the correct drawings will issue with the application, should allowance be forthcoming. In view of the extensive amending, distinguishing features and arguments provide above, such allowance is deemed entirely appropriate.

Respectfully submitted,



By _____

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